

Building Tennessee's Tomorrow: Anticipating the State's Infrastructure Needs

July 2004 through June 2009

Reported Infrastructure Needs by County⁴⁰

One of the difficulties of comparing infrastructure needs across counties is the lack of information about existing infrastructure. No such data is compiled, and without it, it is hard to evaluate the reasonableness of reported needs. Needs in a county could be high because the area has historically had insufficient infrastructure or low because they have been able to meet their needs in the past. Both situations would be reasonable, but reported needs could also be low because local officials do not wish to report needs they don't expect to be met, or they could be high because the items reported are desirable, but not needed.

With each inventory, TACIR staff assesses the potential for over or under reporting by comparing reported needs to indicators of need, such as county size and population, and to factors related to ability to fund infrastructure, such as taxable property and sales. With regional projects factored out, the infrastructure needs reported for all counties across the state have a total cost estimated by local officials at nearly \$21 billion. This figure differs from totals found elsewhere in this report because of the exclusion of regional projects.

Greatest Total Needs Reported for Largest Counties.

Not surprisingly, the greatest infrastructure needs in terms of total estimated costs were reported for the counties with the largest populations. Blount and Sullivan counties are the only ones in the top ten for population that are not also in the top ten for greatest total needs; Wilson and Sevier counties are the only ones among the top ten for reported needs that are not among the ten largest (see Tables 24 and 25). The relationship between population and infrastructure needs is not as strong for the bottom ten counties. Only four of the ten smallest counties are among the bottom ten for total reported need.

While county "top ten" rankings in many of the tables vary from year to year, the list of most heavily populated counties changes very little. Nine of the ten largest counties in 1990 were still in the top ten in 2004 (see Table 25). Washington County was 9th in 1990 and now ranks 11th; Williamson was 11th in 1990 and now ranks 7th. The total infrastructure needs list is almost as stable. Seven of the ten counties

"Infrastructure may not always be a growth magnet or even a prerequisite to growth, but growth demands it."

*Cumberland Region Tomorrow,
www.cumberlandregiontomorrow.org*

⁴⁰ For information on each county, see Appendix D.

reporting the greatest total need—Shelby, Davidson, Hamilton, Knox, Rutherford, Sumner, and Montgomery—are in that group for the fifth consecutive time. Williamson County is part of the group for the fourth straight time. Sevier County is part of it for the second time in a row, and only Wilson County is new to the group. For the three previous inventories, the ten counties with the greatest needs have consistently had more than 49% of the state's total population and anywhere between 55% and 62% of the total infrastructure needs. The percentages are comparable this year.

The pattern is not as strong for the bottom ten counties with only two—Lake and Hancock—on the list five years in a row and one more—Crockett—on the list four years in a row. Two others, Lauderdale and Pickett, have been among the bottom ten for total reported need three times before, but not four years in a row. Their share of the estimated cost of infrastructure needs has remained almost exactly the same despite these changes, but their share of the state's population has fluctuated between 1.7% and 2.8%, resulting in large fluctuations from year to year in this group's reported needs per capita.

Table 24. Largest and Smallest Reported Infrastructure Needs by County
Excluding Projects Identified as Regional
Five-year Period July 2004 through June 2009

Rank	County	Total Reported Cost	Percent of Total	2004 Population	Percent of Total	Cost per Capita
1	Davidson	\$ 3,466,624,278	16.2%	572,475	9.7%	\$6,056
2	Shelby	3,012,139,509	14.1%	908,175	15.4%	\$3,317
3	Williamson	1,037,209,168	4.8%	146,935	2.5%	\$7,059
4	Knox	958,195,597	4.5%	400,061	6.8%	\$2,395
5	Hamilton	920,199,292	4.3%	310,371	5.3%	\$2,965
6	Rutherford	848,742,275	4.0%	210,025	3.6%	\$4,041
7	Montgomery	597,456,774	2.8%	142,204	2.4%	\$4,201
8	Sumner	539,782,894	2.5%	141,611	2.4%	\$3,812
9	Wilson	502,208,751	2.3%	97,891	1.7%	\$5,130
10	Sevier	479,580,394	2.2%	77,270	1.3%	\$6,207
Top Ten Subtotal		\$ 12,362,138,932	57.7%	3,007,018	51.0%	\$4,111
All Others		\$ 8,921,250,488	41.6%	2,745,996	46.5%	\$3,249
86	Lake	22,890,698	0.1%	7,656	0.1%	\$2,990
87	Perry	22,337,420	0.1%	7,673	0.1%	\$2,911
88	Wayne	19,426,046	0.1%	16,869	0.3%	\$1,152
89	Lauderdale	18,788,695	0.1%	26,828	0.5%	\$700
90	Weakley	17,761,316	0.1%	33,733	0.6%	\$527
91	Chester	16,408,199	0.1%	15,773	0.3%	\$1,040
92	Hancock	12,815,550	0.1%	6,643	0.1%	\$1,929
93	Pickett	12,024,276	0.1%	4,881	0.1%	\$2,463
94	Crockett	6,227,225	0.0%	14,553	0.2%	\$428
95	Cannon	6,031,530	0.0%	13,339	0.2%	\$452
Bottom Ten Subtotal		\$ 154,710,955	0.7%	147,948	2.5%	\$1,046
Grand Total		\$ 21,438,100,375	100.0%	5,900,962	100.0%	\$3,633

**Table 25. Infrastructure Improvement Needs Reported
by Most and Least Populous Counties
Excluding Projects Identified as Regional
Five-year Period July 2004 through June 2009**

Rank	County	2004 Population	Percent of Total	Total Reported Cost	Percent of Total	Cost per Capita
1	Shelby	908,175	15.4%	\$ 3,012,139,509	14.1%	\$3,317
2	Davidson	572,475	9.7%	3,466,624,278	16.2%	\$6,056
3	Knox	400,061	6.8%	958,195,597	4.5%	\$2,395
4	Hamilton	310,371	5.3%	920,199,292	4.3%	\$2,965
5	Rutherford	210,025	3.6%	848,742,275	4.0%	\$4,041
6	Sullivan	152,498	2.6%	389,161,766	1.8%	\$2,552
7	Williamson	146,935	2.5%	1,037,209,168	4.8%	\$7,059
8	Montgomery	142,204	2.4%	597,456,774	2.8%	\$4,201
9	Sumner	141,611	2.4%	539,782,894	2.5%	\$3,812
10	Blount	113,744	1.9%	324,401,235	1.5%	\$2,852
Top Ten Subtotal		3,098,099	52.5%	12,093,912,788	56.4%	\$3,904
All Others		2,729,933	46.3%	\$ 9,030,903,873	42.1%	\$3,308
86	Jackson	11,146	0.2%	50,912,359	0.2%	\$4,568
87	Clay	8,006	0.1%	39,929,000	0.2%	\$4,987
88	Houston	7,992	0.1%	27,682,411	0.1%	\$3,464
89	Perry	7,673	0.1%	22,337,420	0.1%	\$2,911
90	Lake	7,656	0.1%	22,890,698	0.1%	\$2,990
91	Trousdale	7,484	0.1%	48,876,000	0.2%	\$6,531
92	Hancock	6,643	0.1%	12,815,550	0.1%	\$1,929
93	Moore	5,978	0.1%	25,281,000	0.1%	\$4,229
94	Van Buren	5,471	0.1%	50,535,000	0.2%	\$9,237
95	Pickett	4,881	0.1%	12,024,276	0.1%	\$2,463
Bottom Ten Subtotal		72,930	1.2%	313,283,714	1.5%	\$4,296
Grand Total		5,900,962	100.0%	\$ 21,438,100,375	100.0%	\$3,633

These fluctuations illustrate what happens when small counties' needs are first identified, driving up estimated costs per capita, and then later are met, causing the costs per capita to fall again. A single project can have this effect in a very small county.

Six of the ten counties with the greatest infrastructure needs are in Middle Tennessee (Davidson, Williamson, Rutherford, Sumner, Wilson, and Montgomery). All six counties are among the top ten for population gain (see Table 26), and three—Davidson, Rutherford, and Sumner—are also among the ten most densely populated counties (see Table 28). Five of the six are also among the ten largest for population (see Tables 24 and 25). TACIR's statistical analysis of all 95 counties indicates that all of these population measures except growth rates are closely related to infrastructure needs.

The population rankings have changed little since the TACIR staff began making these county comparisons in 2001. The ten smallest counties then are still the smallest, and the ten largest counties are still the largest. The percentage of the population concentrated in the ten largest

counties has remained almost exactly the same, fluctuating right around 52.5% across all five reports making these comparisons.

Interestingly, while the bottom ten counties in the population comparison table (see Table 25) remained exactly the same in all five reports making this comparison, and their percentage of the total population increased only slightly (from 1.1% of the state's population to 1.2%), their share of the total cost of needed infrastructure improvements varied from 1.0% of the total to 2.0%. The pattern among these counties over the past five years, again, illustrates the disproportionate effect that even relatively small projects can have in the very smallest counties.

Population Gains Are More Closely Related to Infrastructure Needs Than Population Growth Rates Are.

Nine of the ten counties with the largest total infrastructure needs (Table 24) are also among the ten with the largest population gains between 1990 and 2004 (Table 26). Four of the counties with the smallest

Table 26. Reported Infrastructure Costs for the Ten Counties with the Largest and Smallest Population Gains Excluding Projects Identified as Regional Five-year Period July 2004 through June 2009

Rank	County	Population 1990	Population 2004	Gain (Loss)	Total Reported Cost	Cost per Capita
1	Rutherford	118,570	210,025	91,455	\$ 848,742,275	\$4,041
2	Shelby	826,330	908,175	81,845	3,012,139,509	\$3,317
3	Williamson	81,021	146,935	65,914	1,037,209,168	\$7,059
4	Knox	335,749	400,061	64,312	958,195,597	\$2,395
5	Davidson	510,784	572,475	61,691	3,466,624,278	\$6,056
6	Montgomery	100,498	142,204	41,706	597,456,774	\$4,201
7	Sumner	103,281	141,611	38,330	539,782,894	\$3,812
8	Wilson	67,675	97,891	30,216	502,208,751	\$5,130
9	Blount	85,969	113,744	27,775	324,401,235	\$2,852
10	Sevier	51,043	77,270	26,227	479,580,394	\$6,207
Top Ten Subtotal		2,280,920	2,810,391	529,471	\$ 11,766,340,875	\$4,187
All Others		2,487,619	2,975,777	488,158	\$ 9,147,368,918	\$3,074
86	Grundy	13,362	14,465	1,103	30,925,034	\$2,138
87	Perry	6,612	7,673	1,061	22,337,420	\$2,911
88	Houston	7,018	7,992	974	27,682,411	\$3,464
89	Clay	7,238	8,006	768	39,929,000	\$4,987
90	Obion	31,717	32,393	676	234,010,997	\$7,224
91	Van Buren	4,846	5,471	625	50,535,000	\$9,237
92	Lake	7,129	7,656	527	22,890,698	\$2,990
93	Pickett	4,548	4,881	333	12,024,276	\$2,463
94	Haywood	19,437	19,614	177	71,240,196	\$3,632
95	Hancock	6,739	6,643	(96)	12,815,550	\$1,929
Bottom Ten Subtotal		2,596,265	114,794	6,148	\$ 524,390,582	\$4,568
Grand Total		4,877,185	5,900,962	1,023,777	\$ 21,438,100,375	\$3,633

needs in Table 24 are among the ten with smallest gains⁴¹ in Table 26. The relationship between infrastructure needs and population gain is somewhat stronger than the relationship between needs and total population for the top ten, but somewhat weaker for the bottom ten.

A comparison of Tables 27 and 24 demonstrates that a county's rate of growth is a poor predictor of infrastructure needs. Only five of the fastest growing counties are in the top ten for infrastructure needs: Williamson, Rutherford, Sevier, Wilson, and Montgomery. These same five counties also appear among the top ten for population gain shown in Table 26, but so do four others from the top infrastructure needs list. Among the bottom ten in Table 27, only three counties—Pickett, Weakley, and Hancock—also appear in Table 24 among the bottom ten for total reported infrastructure needs. Pickett and Hancock also appear among the bottom ten for population gain in Table 26, and Hancock County actually declined in population between 1990 and 2004.

Table 27. Cost of Needed Infrastructure Improvements Reported for the Ten Fastest and Slowest Growing Counties Excluding Projects Identified as Regional Five-year Period July 2004 through June 2009

Rank	County	Population 1990	Population 2004	Growth Rate	Total Reported Cost	Cost per Capita
1	Williamson	81,021	146,935	81.4%	\$ 1,037,209,168	\$7,059
2	Rutherford	118,570	210,025	77.1%	848,742,275	\$4,041
3	Sevier	51,043	77,270	51.4%	479,580,394	\$6,207
4	Tipton	37,568	54,722	45.7%	57,233,995	\$1,046
5	Wilson	67,675	97,891	44.6%	502,208,751	\$5,130
6	Cumberland	34,736	50,084	44.2%	356,072,912	\$7,110
7	Jefferson	33,016	47,593	44.2%	139,537,530	\$2,932
8	Meigs	8,033	11,524	43.5%	65,904,686	\$5,719
9	Robertson	41,494	59,322	43.0%	235,952,045	\$3,977
10	Montgomery	100,498	142,204	41.5%	597,456,774	\$4,201
Top Ten Subtotal		573,654	897,570	56.5%	\$ 4,319,898,530	\$4,813
All Others		3,906,894	4,586,195	17.4%	\$ 16,047,512,842	\$3,499
86	Pickett	4,548	4,881	7.3%	12,024,276	\$2,463
87	Unicoi	16,549	17,703	7.0%	49,398,672	\$2,790
88	Carroll	27,514	29,364	6.7%	29,864,992	\$1,017
89	Sullivan	143,596	152,498	6.2%	389,161,766	\$2,552
90	Anderson	68,250	72,244	5.9%	168,447,684	\$2,332
91	Weakley	31,972	33,733	5.5%	17,761,316	\$527
92	Gibson	46,315	48,124	3.9%	85,963,554	\$1,786
93	Obion	31,717	32,393	2.1%	234,010,997	\$7,224
94	Haywood	19,437	19,614	0.9%	71,240,196	\$3,632
95	Hancock	6,739	6,643	-1.4%	12,815,550	\$1,929
Bottom Ten Subtotal		396,637	417,197	5.2%	\$ 1,070,689,003	\$2,566
Grand Total		4,877,185	5,900,962	21.0%	\$ 21,438,100,375	\$3,633

⁴¹ One county (Hancock) actually lost population during that period.

Examination of growth rates contributes little to the understanding of why some counties appear at the top or bottom for total infrastructure needs. TACIR's statistical analysis indicates little relationship between the two. Nor are the lists of counties with the top and bottom ten growth rates as stable as the other top-ten-bottom-ten lists from year to year. Six counties—Williamson, Rutherford, Sevier, Tipton, Cumberland, and Jefferson—have been on the fastest growth rates list in all five reports making the comparison, and only two—Haywood and Hancock—have been on the smallest growth rates list in all five.

Infrastructure Needs Per Capita Are Not Lower In Counties With Higher Population Densities.

Conventional wisdom holds that population density should produce lower infrastructure costs because of economies of scale: the most densely populated counties should have the lowest per capita infrastructure needs. This relationship is not borne out by TACIR's infrastructure inventories based either on comparisons of counties that rank high and low for population density or on statistical analysis. In

Table 28. Infrastructure Improvement Needs Reported by Most and Least Densely Populated Counties Excluding Projects Identified as Regional Five-year Period July 2004 through June 2009

Rank	County	2004 Population	Land Area [square miles]	Population per Square Mile	Total Reported Cost	Cost per Capita
1	Shelby	908,175	755	1,204	\$ 3,012,139,509	\$3,317
2	Davidson	572,475	502	1,140	3,466,624,278	\$6,056
3	Knox	400,061	508	787	958,195,597	\$2,395
4	Hamilton	310,371	542	572	920,199,292	\$2,965
5	Hamblen	59,489	161	369	147,672,246	\$2,482
6	Sullivan	152,498	413	369	389,161,766	\$2,552
7	Washington	110,996	326	340	410,646,250	\$3,700
8	Rutherford	210,025	619	339	848,742,275	\$4,041
9	Bradley	91,196	329	277	181,530,911	\$1,991
10	Sumner	141,611	529	268	539,782,894	\$3,812
Top Ten Subtotal		2,956,897	4,685	631	\$ 10,874,695,018	\$3,678
All Others		2,833,778	32,593	87	\$ 10,048,892,995	\$3,546
86	Fentress	17,023	499	34	63,874,412	\$3,752
87	Humphreys	18,141	532	34	138,710,626	\$7,646
88	Clay	8,006	236	34	39,929,000	\$4,987
89	Bledsoe	12,785	406	31	44,753,500	\$3,500
90	Pickett	4,881	163	30	12,024,276	\$2,463
91	Hancock	6,643	222	30	12,815,550	\$1,929
92	Stewart	12,795	458	28	110,106,532	\$8,605
93	Wayne	16,869	734	23	19,426,046	\$1,152
94	Van Buren	5,471	273	20	50,535,000	\$9,237
95	Perry	7,673	415	18	22,337,420	\$2,911
Bottom Ten Subtotal		110,287	3,939	28	\$ 514,512,362	\$4,665
Grand Total		5,900,962	41,217	143	\$ 21,438,100,375	\$3,633

fact, TACIR analysis consistently indicates either a significant or a highly significant correlation between population density and higher infrastructure costs.

In the latest inventory, six of the ten counties with the highest needs are also among the ten most densely populated—Shelby, Davidson, Knox, Hamilton, Rutherford, and Sumner. Four of the counties with lowest infrastructure needs are also among the ten most sparsely populated. (Compare Tables 24 and 28.) There are several possible explanations for this seeming incongruity, first among them, the fact that five of the six high needs and high density counties (all except Hamilton) are among the ten with the largest population gains from 1990 to 2004. High growth may counter the effect of economies of scale. Another explanation, one that may follow from the first, is that scale is a long term economic benefit that enables a governmental entity to serve citizens more efficiently over time, but that has no relationship to initial investment costs. Improving infrastructure may be inherently more costly in densely populated urban areas because of higher land and labor costs and the need to relocate or modify existing infrastructure to accommodate new infrastructure. Also, densely populated areas may require such infrastructure as storm-water drains, sidewalks, street lighting, and traffic signaling that is not necessary in sparsely populated areas. Finally, urban residents may simply demand and receive more infrastructure-related services than rural residents, and the types of services they need or desire (such as underground wiring) may be more expensive.

Infrastructure needs reported per capita seem to bear little relationship to any population factor except possibly total population. Table 29 shows the top ten and bottom ten counties for infrastructure needs reported per capita along with their populations, population gains and growth rates, and their land area and population densities. There are fast and slow growing counties in both sets of ten presented in this table, but there are no high density or large population counties in the bottom ten.

Greatest Need Per Capita Reported Mainly for Small Counties.

Sevier and Williamson are the only relatively large counties that appear among the top ten for per capita needs. Both are growing rapidly in raw numbers (10th and 3rd largest gains, see Table 26) and in percent change (3rd and 1st highest percents, see Table 27). Williamson is also among the ten most populous counties, ranking 7th; Sevier ranks 15th (see Table 25). Other large, high-growth counties, most notably Montgomery and Rutherford, report much lower per capita needs (30th and 34th highest).

“A popular short-term solution to fiscal stress is to defer infrastructure repairs and/or replacement programs. This is particularly true in rural areas where a declining agricultural base and redirected federal policy have placed significant downward pressure on revenues.”

The Size Efficiency of Rural Governments: The Case of Low-Volume Rural Roads, David L. Chicoine, Steven C. Deller and Norman Walzer

Table 29. Population Factors for Counties w/Highest and Lowest Estimated Costs per Capita
 Excluding Projects Identified as Regional
 Five-year Period July 2004 through June 2009

Rank	County	Population 1990	Population 2004	Change	Growth Rate	Land Area [sq. miles]	Population Density	Total Reported Cost	Cost per Capita
1	Van Buren	4,846	5,471	625	12.9%	273	20	\$ 50,535,000	\$9,237
2	Stewart	9,479	12,795	3,316	35.0%	458	28	110,106,532	\$8,605
3	Humphreys	15,795	18,141	2,346	14.9%	532	34	138,710,626	\$7,646
4	DeKalb	14,360	18,213	3,853	26.8%	305	60	137,872,341	\$7,570
5	Obion	31,717	32,393	676	2.1%	545	59	234,010,997	\$7,224
6	Cumberland	34,736	50,084	15,348	44.2%	682	73	356,072,912	\$7,110
7	Williamson	81,021	146,935	65,914	81.4%	583	252	1,037,209,168	\$7,059
8	Trousdale	5,920	7,484	1,564	26.4%	114	66	48,876,000	\$6,531
9	McMinn	42,383	50,981	8,598	20.3%	430	118	327,350,778	\$6,421
10	Sevier	51,043	77,270	26,227	51.4%	592	130	479,580,394	\$6,207
Top Ten Subtotal		291,300	419,767	128,467	44.1%	4,515	17	\$ 2,920,324,748	\$6,957
All Others		4,351,730	5,206,252	854,522	19.6%	31,959	13	\$ 18,277,446,871	\$3,511
86	Wayne	13,935	16,869	2,934	21.1%	734	23	19,426,046	\$1,152
87	Tipton	37,568	54,722	17,154	45.7%	459	119	57,233,995	\$1,046
88	Chester	12,819	15,773	2,954	23.0%	289	55	16,408,199	\$1,040
89	Carroll	27,514	29,364	1,850	6.7%	599	49	29,864,992	\$1,017
90	Dyer	34,854	37,621	2,767	7.9%	510	74	37,177,278	\$988
91	Lincoln	28,157	32,141	3,984	14.1%	570	56	31,409,480	\$977
92	Lauderdale	23,491	26,828	3,337	14.2%	470	57	18,788,695	\$700
93	Weakley	31,972	33,733	1,761	5.5%	580	58	17,761,316	\$527
94	Cannon	10,467	13,339	2,872	27.4%	266	50	6,031,530	\$452
95	Crockett	13,378	14,553	1,175	8.8%	265	55	6,227,225	\$428
Bottom Ten Subtotal		234,155	274,943	40,788	17.4%	4,743	596	\$ 240,328,756	\$874
Grand Total		4,877,185	5,900,962	1,023,777	21.0%	41,217	143	\$ 21,438,100,375	\$3,633

The other eight counties in the top ten demonstrate the fact that needs such as courthouse renovations, new schools, and road improvements that would seem moderate or even small in large counties have a disproportionate effect when compared to population in small counties. Van Buren County, which has a population of only 5,471, has been among these ten counties now in all five TACIR reports presenting this information. Three large projects place it near the top of the list for needs per capita in this report; all three projects relate to State Route 111. Without these three projects, Van Buren would fall out of the top ten, and its revised rank would be 78th in Table 28 with a per capita need of only \$1,761. This is an extreme example of how large, unmet needs can place a small county that would not otherwise be there in the top ten for per capita costs and keep them there until those needs are met.

Three counties—Tipton, Lauderdale, and Weakley—have been among the bottom ten for reported needs per capita in all five reports. Tipton's placement in the bottom ten continues to be surprising because of its rapid growth. It is the state's 24th largest county in terms of population and had the 16th largest population gain from 1990 to 2004. And it is the 4th fastest growing in percentage terms, but does not follow the general pattern of high infrastructure needs reported for other high population and high growth counties. The county with the next highest growth rate among the bottom ten is Cannon County, which is 79th in population and had the 66th largest population gain from 1990 to 2004 (31st largest in percentage terms), but it is 94th for infrastructure needs reported per capita.

Statistical Analyses Confirm Inferences About Population and Infrastructure Needs but Tax Base Factors Are More Closely Related to Reported Needs.

Analysis of the top ten and bottom ten counties for various population factors presumed to be related to infrastructure needs suggests conclusions that can be verified by statistical analysis of all ninety-five counties. Statistical analysis can also suggest explanations for things general observation cannot, and it can help estimate infrastructure needs that may have been missed by the inventory. The inventory is entirely voluntary on the part of local officials, and they may participate more or less enthusiastically depending on how valuable they consider the process. Variations in their willingness or ability to provide comparable information about their needs may help explain the seemingly weak relationship between population factors and the infrastructure needs reported by counties that appear on the bottom ten lists.

To answer these questions, TACIR analysts compared various factors related to local governments' ability to fund infrastructure as well as factors related to needs. The first comparison produced the set of simple correlation measures, called correlation coefficients, presented in Table 30. Correlation coefficients measure the strength of the

Table 30. Correlation between Reported Infrastructure Needs and Related Factors in Order of Strength of Relationship

Factors Related to Reported Needs	Correlation Coefficient
Taxable Property Value	0.973
Taxable Sales	0.962
Personal Income	0.953
2003 Population	0.930
2003 Population Density	0.922
Population Gain or Loss	0.783
Land Area (square miles)	0.290
Population Growth Rate	0.087

relationship between two sets of numbers and range from zero to one. The coefficient will be positive if one set of numbers increases as the other increases or if it decreases as the other decreases; it will be negative if one increases as the other decreases. A perfect relationship between the two sets of numbers would be either 1.0 or -1.0.

Table 30 shows a strong relationship between reported needs and both taxable property and taxable sales. These results are consistent with previous reports. But most population factors show nearly as strong a relationship with reported needs. In contrast, the coefficient for population growth rate and

reported needs, at only 0.087, is insignificant. The coefficients for population factors confirm the general inferences drawn from the top-ten-bottom-ten review:

- Total population is a strong indicator of infrastructure needs.
- Higher population densities correspond to higher infrastructure needs, and lower densities correspond to lower needs.
- Population gain is closely related to infrastructure needs, but growth rates, with the correlation coefficient closest to zero, are not.
- Land area is a weak indicator of needs; of the factors compared here, only growth rate is weaker.

The most interesting inference from the comparison, however, is that **tax base factors and income consistently correspond more closely to reported needs than the population factors do.** These near perfect relationships suggest that indicators of ability to fund infrastructure may strongly influence local officials as they respond to the inventory, or they may simply reflect the common sense inference that tax base and income tend to concentrate where population concentrates.